

EULIMA COSSMANNI n. sp.

M. Cossmann has figured in "Notes Complementaires," Pl. I, fig. 34, page 27, 1893, as *Rissoina notata* Lea, a form that is not the species of Lea but a new form of *Eulima*, which may be called *E. cossmanni*. The shell described by Lea is also a *Eulima*.

The description and figure given by M. Cossmann are accurate for this new species. The true species of Lea also has a sinuous outer lip.

Dr. Paul Bartsch has examined specimens of the true *Pasithea elegans* H. C. Lea, and finds it to be a *Bittium*.

NOTES ON TRUNCILLA, WITH A KEY TO THE SPECIES.

BY BRYANT WALKER.

As the highest expression of *Unione* development, the *Truncilla* are of special interest to the systematic conchologist. Not only are the sexes sharply differentiated in all the species, but the species themselves are more clearly defined and less subject to variation than in any other of the recognized genera.

For this reason, the species are well adapted to the rigid limitations of a key, which in the more variable groups would, in many cases, be almost impracticable. But in genera such as this, where the specific lines can be drawn with sufficient exactness for such a purpose, the formation of a key, besides facilitating the identification of the species, is of great service in developing the peculiar distinguishing characters of the different species, and thus determining their proper position in a natural arrangement.

In attempting to make a key to the species of *Truncilla*, it almost immediately became obvious that, owing to the extreme differentiation of the sexes, which very often was not along analogous lines in species of the same group, a single key including both sexes was not feasible, and accordingly a separate key for each sex was made.

This condition also demonstrated that a consistent natural arrangement of the species would have to be based primarily on the variations of one of the sexes.

In view of the fact that the most recent classification of the *Unionida* is based primarily on the modifications of the gill of the

female incident to reproduction, and that *Truncilla* is the genus in which the sexual differentiation of the female has been carried out to the greatest extent, it would seem desirable that a systematic arrangement of the species in the genus should be, as far as possible, based on that feature.

At the present time such an arrangement must necessarily be based almost wholly on shell characters, and these are mainly to be found in the position of the so-called marsupial expansion. The indications afforded by these characters should, of course, be supplemented by an exhaustive study of the gill itself and its modifications for the purpose of a marsupium, and, until that is done, it is scarcely advisable to attempt to define the subordinate groups in any formal manner or to change the present classification.

In respect to their peculiar shell characters, the female *Truncilla* fall naturally into three groups :

1. Those in which the entire post-basal area is occupied by the marsupial expansion.

This group is more closely allied in this respect to *Lampsilis* than any of the others, and is apparently the more primitive form. *T. perplexa* is the leading exponent of this group.

2. Those in which the marsupial expansion is restricted substantially to an inflation and modification of the posterior ridge.

This might be considered the next stage of development, and is typified by *T. triquetra*.

3. Those in which the marsupial expansion is anterior to the posterior ridge and more or less distinctly separated from it.

The extreme form of this group is the well-known *T. foliata*, which may well be considered the most highly organized species of the genus. Between it and *T. hayesiana*, in which the expansion, though anterior to the posterior ridge, is scarcely differentiated from it, and which may, therefore, be considered the other extreme of the series, there is a very considerable amount of variation in this particular. An intermediate stage is that represented by *T. sulcata* and *lenior*, in which the expansion, though distinct, is separated from the posterior ridge by a narrow but deep sulcus, which forms a distinct notch at the margin, instead of the wide emargination that is present in *foliata* and its immediate allies.

Arranged in this way the species show a distinct line of evolution, from the simple to the complex, caused by the progressive differ-

entiation of the marsupial expansion and its advance from a position at the extreme posterior part of the shell to a median one almost directly under the beaks.

An arrangement of the species in this manner would result as follows:

1. Marsupial expansion occupying the entire post-basal area :

<i>T. perplexa</i> ,	<i>T. biemarginata</i> ,
<i>T. perplexa rangiana</i> ,	<i>T. capsæformis</i> ,
<i>T. sampsoni</i> ,	<i>T. florentina</i> ,
<i>T. propinqua</i> .	<i>T. deviata</i> .
2. Marsupial expansion formed by an inflation of the posterior ridge :
 - A. Not extending below the basal line :

<i>T. triquetra</i> ,	<i>T. arcaiformis</i> .
-----------------------	-------------------------
 - B. Extending below the basal line :

<i>T. penita</i> ,	<i>T. compacta</i> ,	<i>T. metastriata</i> .
--------------------	----------------------	-------------------------
3. Marsupial expansion in front of the posterior ridge and more or less separated from it :
 - A. Scarcely differentiated from the posterior ridge :

<i>T. hayesiana</i> ,	<i>T. modicella</i> ,	<i>T. othcaloogaensis</i> .
-----------------------	-----------------------	-----------------------------
 - B. Separated from the posterior ridge by a narrow sulcus, notching the post-basal margin :

<i>T. brevidens</i> ,	<i>T. sulcata</i> ,	<i>T. lenior</i> .
-----------------------	---------------------	--------------------
 - C. Separated from the posterior ridge by a wide emargination :

<i>T. personata</i> ,	<i>T. lewisii</i> ,
<i>T. stewardsonii</i> ,	<i>T. foliata</i> .

It is to be noted that while *brevidens* from the position of the expansion falls in this group, in other characters it is more closely related to *penita* and *compacta* and thus forms a connecting link between the two groups. It might, perhaps, be considered an example of development along similar lines arising from a different ancestral stock. It also illustrates the futility of attempting to draw arbitrary lines in any system of classification. Nature does not do things in that way.

In this arrangement, the synonymy as established by Simpson is followed, with the exception that *T. compacta* Lea is recognized as distinct from *penita* Con. Mr. Simpson informs me that, from the examination of additional material since the publication of the Synopsis, he has come to the same conclusion.

T. metastriata is doubtfully distinct from *compacta* and is probably, at the most, only a local form peculiar to the Black Warrior river. If this is correct, it has priority over *compacta*.

The male of *T. othcaloogaensis* is unknown.

KEY TO THE SPECIES OF TRUNCILLA.

A. Males.

- | | | | |
|-----|---|--|----------------------------|
| 1. | { | Shell with a distinct radial furrow in front of the posterior ridge | 2. |
| | { | Shell without a distinct radial furrow in front of the posterior ridge | 12. |
| 2. | { | Shell subquadrate or subtriangular; radial furrow subvertical | 3. |
| | { | Shell suboval; radial furrow oblique | 8. |
| 3. | { | Shell subcompressed, subquadrate or broadly subtriangular; umbonal region flattened, beaks depressed | 4. |
| | { | Shell subtriangular; beaks elevated, umbonal region inflated | 7. |
| 4. | { | Posterior ridge strongly biangulate | <i>biemarginata</i> . |
| | { | Posterior ridge rounded | 5. |
| 5. | { | Central ridge well developed, forming an obtuse angle in the basal line at its extremity, between which and the posterior ridge the base line is nearly straight, radial furrow wide and conspicuous | 6. |
| | { | Central ridge less developed, not projecting beyond the basal outline, which is scarcely emarginate in front of the posterior ridge, radial furrow subobsolete | <i>stewardsonii</i> . |
| 6. | { | Shell subquadrate, solid, central ridge subnodulous, radial furrow deep | <i>foliata</i> . |
| | { | Shell smaller, subsolid, central ridge smoother, radial furrow less impressed | <i>lewisii</i> . |
| 7. | { | Posterior slope smooth, nacre white | <i>personata</i> . |
| | { | Posterior slope radially striate, nacre usually purple. | <i>hayesiana</i> . |
| 8. | { | Posterior slope convex, posterior end below the middle | 9. |
| | { | Posterior slope nearly straight, posterior end at or above the middle | 10. |
| 9. | { | Central ridge nodulous | <i>perplexa</i> . |
| | { | Central ridge smooth | <i>propinqua</i> . |
| 10. | { | Post-basal margin emarginate | 11. |
| | { | Post-basal margin squarely subtruncate | <i>sulcata</i> . |
| 11. | { | Shell short oval, post-basal emargination deep, umbonal region greatly inflated | <i>sampsoni</i> . |
| | { | Shell more elongate, post-basal emargination shallow, umbonal region less inflated | <i>perplexa rangiana</i> . |
| | { | Shell smaller, posterior ridge biangulate, basal emargination shallow, beaks prominent | <i>deviata</i> . |

- | | | | |
|-----|---|--|----------------------|
| 12. | { | Posterior ridge rounded | 13. |
| | { | Posterior ridge more or less distinctly biangulate | 19. |
| 13. | { | Posterior slope distinctly flattened | 14. |
| | { | Posterior slope not flattened | 18. |
| 14. | { | Umbonal region flattened | 15. |
| | { | Umbonal region inflated | 16. |
| 15. | { | Shell subquadrate, subcompressed | <i>brevidens</i> . |
| | { | Shell smaller, oval, less compressed, beaks more anterior. | <i>metastriata</i> . |
| 16. | { | Shell distinctly triangular, anterior margin not projecting much beyond the anterior umbonal slope, unicolorated or with capillary green rays | 17. |
| | { | Shell triangularly ovate, anterior margin projecting beyond the umbonal slope, conspicuously painted with green rays and blotches | <i>triquetra</i> . |
| 17. | { | Beaks flattened, subcentral | <i>penita</i> . |
| | { | Beaks higher, more anterior, shell smaller | <i>compacta</i> . |
| 18. | { | Shell small, subtriangular, thick and solid | <i>modicella</i> . |
| | { | Shell larger, oval and thin | <i>lenior</i> . |
| 19. | { | Shell large, greatly inflated, thick, solid, posterior ridge very prominent, posterior slope with a well-defined furrow, surface rough, rays capillary | <i>arcæformis</i> . |
| | { | Shell smaller, less inflated, posterior ridge less developed. surface smooth, broadly rayed with green | 20. |
| 20. | { | Shell subcompressed, elliptical | <i>capsæformis</i> . |
| | { | Shell smaller, short oval, quite inflated | <i>florentina</i> . |

B. Females.

- | | | | |
|----|---|--|---------------------|
| 1. | { | Marsupial expansion swollen | 2. |
| | { | Marsupial expansion flattened | 13. |
| 2. | { | Marsupial expansion an inflation of the posterior ridge | 3. |
| | { | Marsupial expansion in front of and distinctly separated from the posterior ridge | 9. |
| 3. | { | Posterior ridge angularly inflated and curved backwards | 4. |
| | { | Posterior ridge roundly inflated and curved forwards | 5. |
| 4. | { | Posterior ridge sharp, dorsal slope obliquely truncate, flattened, base of expansion rounded | <i>triquetra</i> . |
| | { | Posterior ridge less angular, dorsal slope not flattened, biangular, base of expansion flattened | <i>arcæformis</i> . |
| 5. | { | Base of expansion distinctly projecting beyond the basal line | 6. |
| | { | Base of expansion scarcely projecting beyond the basal line | 8. |

6. { Posterior ridge inflated, basal expansion rounded, its margin rounded 7.
 { Posterior ridge not inflated, basal expansion flattened, its margin subquadrate *penita*.
7. { Shell large, subquadrate, disk distinctly flattened, with numerous, fine, capillary rays *brevidens*.
 { Shell smaller, subtriangular, posterior ridge inflated, rayless. *compacta*.
 { Shell still smaller, beaks less elevated, greatly inflated posteriorly, rayless *metastriata*.
 { Shell very small, subquadrate, marsupial expansion narrow and not much inflated *modicella*.
8. { Posterior slope radially striate, a median furrow in front of the marsupial expansion, nacre usually purple . *hayesiana*.
 { Posterior slope scarcely striate, no median furrow, nacre white *othcaloogaensis*.
9. { Marsupial expansion a prolongation of the median ridge, separated from the posterior ridge by a wide emargination 10.
 { Marsupial expansion occupying and nearly filling the radial furrow, not projecting beyond the basal line . . *personata*.
 { Marsupial expansion at posterior base and separated from the posterior ridge by a deep sulcus, notching the margin . 12.
10. { Marsupial expansion rounded 11.
 { Marsupial expansion triangular *lewisii*.
11. { Shell large, center of disk inflated, marsupial expansion separated from posterior ridge by a deep median furrow. *foliata*.
 { Shell much smaller, center of disk compressed, no median furrow *stewardsonii*.
12. { Shell quadrate, rather solid, marsupial expansion extending beyond the posterior ridge *sulcata*.
 { Shell smaller, oblong, thin, marsupial expansion not extending beyond the posterior ridge *lenior*.
13. { Entire post-basal region flatly and broadly expanded, marsupial extension thin, shining, and of different texture from the rest of the shell 14.
 { Expansion of the post-basal region less extensive, less compressed, and of the same color and texture as the rest of the shell 15.
14. { Shell with a distinct radial furrow and nodulous median ridge *perplexa*.
 { Shell smaller, smooth, and without a distinct radial furrow. *capsæformis*.
15. { Shell with a distinct radial furrow extending to the beaks. 16.
 { Shell without a distinct radial furrow 17.

- | | | |
|-----|---|--|
| 16. | { | Shell oval, umbonal region inflated, beaks prominent, posterior ridge rounded <i>propinqua</i> . |
| | { | Shell subquadrate, umbonal region compressed, beaks flattened, posterior ridge biangulate <i>biemarginata</i> . |
| 17. | { | Shell larger, solid, margin of marsupial expansion simple. 18. |
| | { | Shell much smaller, thinner, margin of marsupial expansion dentate 19. |
| 18. | { | Shell subquadrate, marsupial expansion small, posterior margin subtruncate, umbonal region greatly inflated. <i>sampsoni</i> . |
| | { | Shell oval, marsupial expansion larger, posterior margin regularly rounded, umbonal region less inflated . <i>rangiana</i> . |
| 19. | { | Shell obovate, marsupial expansion extending below the base line, beaks depressed, dorsal slope rounded . <i>florentina</i> . |
| | { | Shell subtriangular, marsupial expansion not extending below the base line, beaks prominent, dorsal margin elevated <i>deviata</i> . |

SHELLS FROM THE BAY OF CADIZ REGION.

BY MAXWELL SMITH.

While on a recent visit to Spain I arranged to spend three days on the shores of the Bay of Cadiz in hopes of contributing toward the knowledge of its molluscan fauna. With the limited time at my disposal only a superficial inspection of the beaches could be made, but the results were so satisfactory, although yielding only a comparatively small series of species, that I felt that I was indeed amply repaid.

By comparing the list which follows this article it will be seen that the material brought together is a curious mixture of Mediterranean, African and Atlantic shells. Just what lives in the bay, and what not, can only be determined by careful dredgings.

Through the kindness of Mrs. Whishaw, of Seville, her summer home, an old palace dating from the 16th century, was placed at our disposal. This was located on the shore of the Bay of Cadiz at the town of Port Saint Mary, or Puerto de la Santa Maria as it is called in Spanish.

It was on April 30 of this year that we left the heat of Seville and rode by train through this rich wine-growing section of the country down to the bay. Port Saint Mary was found to be a typical Spanish